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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

#18
8-3-02

In re the Application of: **HIROOKA, et al.**

Group Art Unit: **1746**

Serial No.: **09/337,278**

Examiner: **Jiri F. Smetana**

Filed: **June 22, 1999**

P.T.O. Confirmation No.: 8796

FOR: **CLEANING AND HANDLING METHODS OF ELECTRONIC COMPONENT AND CLEANING APPARATUS THEREOF**

SUBMISSION OF APPEAL BRIEF

Commissioner for Patents
Washington, D.C. 20231

August 26, 2002

Sir:

Submitted herewith are an original and two copies of an Appeal Brief in the above-identified U.S. patent application.

Also enclosed is a check in the amount of $320.00 to cover the cost of filing this Appeal Brief. In the event that any additional fees are due with respect to this paper, please charge Deposit Account No. 01-2340. This paper is filed in triplicate.

Respectfully submitted,

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Enclosures: Duplicate of this paper; Appeal Brief and two copies; and check for $320.00

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

APPEAL BRIEF FOR THE APPELLANT

Ex parte **Taisuke HIROOKA et al.** (applicants)

CLEANING AND HANDLING METHODS OF ELECTRONIC COMPONENT AND CLEANING APPARATUS THEREOF

Serial Number: **09/337,278**

Filed: **June 22, 1999**

Appeal No. :

Group Art Unit: **1746**

Examiner: **Jiri F. Smetana**

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Date: **August 26, 2002**

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BRIEF ON APPEAL

I. REAL PARTY IN INTEREST

The real party in interest is Sumitomo Special Metals Co., Ltd., by virtue of an assignment recorded in the U.S. Patent and Trademark Office on June 22, 1999, at reel/frame: 010062/0991.

II. RELATED APPEALS AND INTERFERENCES

There are no other appeals or interferences known to Appellant, Appellant's legal representative, or assignee, which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

III. STATUS OF CLAIMS

Claims 1, 3, 5, and 7-19 are pending. Claims 11-19 stand withdrawn from further consideration as being directed to a non-elected invention. Claims 2, 4, and 6 have been canceled. Claims 1, 3, 5, and 7-10 are appealed.

However, an Amendment After Final Rejection is filed herewith requesting cancellation of claim 8 since it depends from canceled claim 4. Upon entry of the amendment, claims 1, 3, 5, 7, and 9-19 will be pending.

IV. STATUS OF AMENDMENTS

An Amendment After Final Rejection is filed herewith to cancel claim 8 and to amend claim 10 to reflect cancellation of claim 8. The claims in the Appendix reflect these amendments.

V. SUMMARY OF THE INVENTION

The invention set forth in claim 1 is directed to a cleaning method of an electronic component, wherein an object to be cleaned is cleaned by bringing a sponge member into contact with the object to be cleaned while supplying, to said object to be cleaned, water containing carbon dioxide gas having a resistivity value of less than 5MΩ.

Claim 9 is directed to a cleaning method of an electronic component wherein an object to be cleaned is soaked in cleaning water having a resistivity value of 10MΩ or less before cleaning.

The claimed methods allow it to become possible to achieve rapid and excellent cleaning by extremely simple means, *i.e.,* by adjusting the resistivity of the cleaning water.

VI. ISSUES

The following issues are presented on appeal:

1. Whether claims 1 and 5 are unpatentable over ***Miyashita et al.*** in view of ***Kanno***;

2. Whether claims 1 and 5 are unpatentable under 35 U.S.C. §103(a) over ***Miyashita et al.*** and ***Kanno*** in view of ***Takehiko et al.***;

3. Whether claims 3, 7, and 8 are unpatentable under 35 U.S.C. §103(a) over ***Miyashita et al.*** and ***Kanno*** in view of ***Simmons et al.***;

4. Whether claims 3, 7, and 8 are unpatentable under 35 U.S.C. §103(a) over ***Miyashita et al., Kanno*** and ***Takehiko et al.*** in view of ***Simmons et al.***;

5. Whether claims 9 and 10 are unpatentable under 35 U.S.C. §103(a) over ***Miyashita et al., Kanno*** and ***Simmons et al.*** in view of ***Chung et al.***; and

6. Whether claims 9 and 10 are unpatentable under 35 U.S.C. §103(a) over ***Miyashita et al., Kanno, Simmons et al.***, and ***Takehiko et al.*** in view of ***Chung et al.***

VII. GROUPING OF THE CLAIMS

For each ground of rejection, the claims can be considered to stand or fall together with the exception of issues 5 and 6 (claims 9 and 10) for the reasons detailed in the argument.

VIII. ARGUMENTS

1. Claims 1 and 5 are patentable under 35 U.S.C. §103(a) over *Miyashita et al.* and *Kanno*

Miyashita et al. is directed to a double side cleaning apparatus including a pair of roll-like brushes and at least one cleaning brush. A cleaning processing liquid is supplied into hollow

portions 3a and 4a of roll-like brushes 3 and 4. The processing liquid supplied into the hollow portions 3a and 4a of the roll-like brushes 3 and 4 is discharged to the outside easily because of a difference between the inner and outer pressures. A processing liquid supply unit 29 supplies either one of isopropyl alcohol, ozone water, ionized water and pure water to the hollow portions 3a and 4a. The ionized water is obtained by electrolyzing pure water or the like and includes alkali ionized water and acid ionized water. The ionized water generator generates ionized water by electrolyzing pure water or ultra pure water, which ***Miyashita et al.*** refers to pure water as high purity water having a resistivity of about 5MΩcm to 18MΩcm.

The pressurized processing liquid is sprayed from the hollow portions 3a and 4a to be blown toward the upper and lower surfaces of the semiconductor wafer 1, as shown in Fig. 2 and described at column 5, lines 25-37. Since the blow pressures from the hollow portions 3a and 4a are equal, the wafer 1 is held between the brushes 3 and 4 so as not to be in contact with them.

As acknowledged by the Examiner, ***Miyashita et al.*** does not disclose that the resistivity of cleaning water is adjusted by including carbon dioxide gas. ***Kanno*** is applied by the Examiner for its disclosure of carbon dioxide gas in cleaning water at column 7, lines 11-20. This disclosure, however, describes that the foaming gas employed by ***Kanno*** may be CO_2, N_2, O_2 or the like. In the description of the background art of ***Kanno***, a description is provided wherein a problem of generating static charge on the surface of the wafer 1 by spurting liquid damages a device thereon. As such, it is considered to reduce this damage by reducing resistivity of pure water by mixing a CO_2 gas, although such cannot fully prevent the damage.

The Examiner argues that it would have been obvious to adjust the resistivity of the cleaning water by including carbon dioxide gas, and that the teaching of a resistivity of about 5MΩ to 18MΩ would allow for lower resistivities to be included.

Claim 1 requires bringing a sponge member into contact with the object to be cleaned while supplying, to said object to be cleaned, water containing carbon dioxide gas having a resistivity value of less than 5MΩ. The cited art fails to teach or suggest the claimed invention.

Miyashita et al. fails to teach the feature of claim 1 of bringing a sponge member into contact with the object to be cleaned while supplying, to said object to be cleaned, water containing carbon dioxide gas having a resistivity value of less than 5MΩ. As acknowledged by the Examiner, ***Miyashita et al.*** does not teach water-containing water containing carbon dioxide gas. However, ***Miyashita et al.*** also fails to teach bringing a sponge member into contact with the object to be cleaned while supplying, to said object to be cleaned, the water. In ***Miyashita et al.***, the semiconductor wafer (object to be cleaned) is arranged between the brushes in a non-contact manner during its supply of cleaning agent. Accordingly, even if the teachings of ***Miyashita et al.*** could be considered to include a resistivity value of less than 5MΩ, the combination of references fails to teach each and every feature of claims 1 and 5. As such, the Examiner has failed to raise a prima facia rejection of the claims.

Even assuming that the Examiner has established a prima facia rejection of the claims, such a rejection has been rebutted by the showing of unexpected results. A Declaration under 37 C.F.R. §1.132 was filed with the response of May 20, 2002. The Declaration showed that there is an unexpected increase in the particle elimination rate as the value of resistivity changes from

10MΩ to less than 5MΩ. As illustrated in the graph attached to the Declaration, the particle elimination rate increased substantially when the resistivity value was less than 5MΩ.

2. Claims 1 and 5 are patentable under 35 U.S.C. §103(a) over *Miyashita et al.* and *Kanno* in view of *Takehiko et al.*

As noted above, ***Miyashita et al.*** would not meet the limitations of bringing a sponge member into contact with the object to be cleaned while supplying, to the object to be cleaned, water having a resistivity value of less than 5MΩ since the sponge member is not in contact with the wafer during cleaning. Furthermore, the reference made to the background of the invention of ***Miyashita et al.*** only discusses a roll-like brush, not a sponge member as claimed.

Takehiko et al. is applied in the rejection for its disclosure of resistivity of water being 0.1 to 3.0MΩ by bubbling carbon dioxide into the water. The Examiner argues that it would have been obvious to employ a resistivity value of less than 5MΩ because ***Takehiko et al.*** teaches that such low resistivity prevents electrification of a wafer during cleaning.

The abstract of ***Takehiko et al.*** teaches that surface roughness of a compound semiconductor wafer can be eliminated by preventing electrification of the wafer during cleaning. However, ***Takehiko et al.*** is directed to a method for cleaning a semiconductor wafer by using ultra-pure water in a final process of cleaning. After an undoped GaAs wafer is passed through a mechanochemical polishing process, it is cleaned ultrasonically in organic solvent. Then it is cleaned by GaAs cleaning solution and thereafter lastly cleaned by ultra-pure water.

The teachings of ***Takehiko et al.*** would not have motivated one of ordinary skill in the art to have made the modifications asserted by the Examiner. ***Takehiko et al.*** merely teaches use of

cleaning water having a resistivity value of 0.1 to 3.0 MΩ which is used in the last step of its process. ***Takehiko et al.*** would not have motivated one of ordinary skill in the art to have modified the teaches of ***Miyashita et al.*** to employ a lower resistivity in its cleaning step. There is no suggestion to employ water containing carbon dioxide gas having a resistivity of less than 5MΩ while being supplied to a sponge member as set forth in claim 1.

3. Claims 3, 7, and 8 are patentable under 35 U.S.C. §103(a) over *Miyashita et al.* and *Kanno* in view of *Simmons et al.*

The Examiner argues that ***Simmons et al.*** would have rendered it obvious to separate the sponge member from the object to be cleaned during cleaning since ***Simmons et al.*** teaches cleaning contaminants. However, the portions highlighted by the Examiner teach a method for cleaning contaminants from a brush when the pH level of the brush is raised. As such, the teachings of ***Simmons et al.*** would not suggest the features of the sponge member being separated from said object to be cleaned during cleaning and said water is supplied also to said separated sponge member.

In the Advisory Action, the Examiner comments that ***Simmons et al.*** meets the limitations by its disclosure at column 3, lines 10-19 and column 4, lines 3-6. However, these portions provide no teaching or suggestion of separating a sponge member from the object to be cleaned during cleaning and that the water is supplied also to the separated sponge member, in combination with the features set forth in claim 1.

4. Claims 3, 7, and 8 are patentable under 35 U.S.C. §103(a) over *Miyashita et al.*, *Kanno* and *Takehiko et al.*, in view of *Simmons et al.*

In the final Office Action, the Examiner characterizes ***Miyashita et al.*** as disclosing bringing a sponge member into contact with the object to be cleaned while supplying water having a resistivity value of about 5MΩ to 18MΩ. However, as noted above, the object to be cleaned does not contact a sponge member while supplying the water.

Miyashita et al. also does not disclose a resistivity value of less than 5MΩ adjusted by including carbon dioxide.

The Examiner highlights that the background art of ***Kanno*** teaches that damage of liquid colliding against the surface of a wafer at high speed can be reduced by reducing resistivity of pure water by mixing a CO_2 gas. Furthermore, the Examiner cites ***Takehiko et al.*** for its disclosure of adjusting the resistivity value to 0.1 to 3.0MΩ in a final process of cleaning.

The Examiner has failed to raise a prima facia rejection of the claims. In particular, the Examiner has failed to explain or show why one of ordinary skill in the art would have been motivated by the teachings of the cited art to combine the references in the manner urged by the Examiner.

Although ***Takehiko et al.*** discloses that the resistivity value can be adjusted to 0.1 to 3.0MΩ, such is made in reference to a final process of cleaning. There is no suggestion provided by ***Takehiko et al.*** to adjust the resistivity of cleaning water which is supplied to a sponge member. That is, the teachings of ***Takehiko et al.*** would not have suggested or motivated one of ordinary skill in the art to modify the teachings of ***Miyashita et al.*** as asserted by the Examiner.

5. Claims 9 and 10 are patentable under 35 U.S.C. §103(a) over *Miyashita et al.*, *Kanno* and *Simmons et al.*, in view of *Chung et al.*

Claim 9 is directed to a cleaning method of an electronic component wherein an object to be cleaned is soaked in cleaning water having the resistivity value of 10MΩ or less before cleaning.

Chung et al. is applied by the Examiner for its disclosure that after a photolithography process, photoresist stripper must be removed from the wafer by a process such as rinsing before wafer processing, highlighting column 1, lines 23-25 and column 3, lines 50-52. The disclosure of ***Chung et al.***, however, does not provide any teaching or suggestion of soaking as required by claim 9. That is, there is no teaching or suggestion of performing the claimed soaking prior to cleaning. Furthermore, the primary references to ***Miyashita et al.***, ***Kanno***, and ***Simmons et al.*** also fail to provide any teaching or suggestion with respect to soaking, let alone soaking in water having a resistivity value of 10MΩ or less before cleaning.

Claim 10 depends from any one of claims 1, 3, 5 or 7 to 9. Thus, claim 10 as it depends from claim 1, requires soaking of the object to be cleaned in water having a resistivity value of 10MΩ or less before cleaning, and then cleaning the object as set forth in claim 1. There is no motivation to combine the references in the manner suggested by the Examiner to obtain the claimed invention.

6. Claims 9 and 10 are patentable under 35 U.S.C. §103(a) over *Miyashita et al.*, *Kanno*, *Simmons et al.*, and *Takehiko et al.*, in view of *Chung et al.*

None of the references relied upon by the Examiner teaches or suggests that the object to be cleaned is soaked in water having a resistivity value of 10MΩ or less before cleaning. Although ***Chung et al.*** teaches rinsing of wafer containing a film of residual photoresist stripper

by inserting into a vessel filled with de-ionized water, ***Chung et al.*** does not provide any suggestion which would have motivated one of ordinary skill in the art to then perform a cleaning operation by use of a sponge member. The mere fact that ***Chung et al.*** teaches that after a photolithography process in stripping of the photoresist that the stripper must be removed by rinsing process would not have motivated one of ordinary skill in the art to have modified ***Miyashita et al.*** so as to perform a soaking prior to cleaning.

Claim 10 depends from any one of claims 1, 3, 5 or 7 to 9. Thus, claim 10 as it depends from claim 1, requires soaking of the object to be cleaned in water having a resistivity value of 10MΩ or less before cleaning, and then cleaning the object as set forth in claim 1. There is no motivation to combine the references in the manner suggested by the Examiner to obtain the claimed invention.

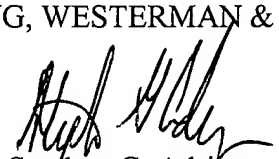
IX. CONCLUSIONS

For all the foregoing reasons, the Board is respectfully requested to reverse the rejections of the Examiner.

In the event this paper is not timely filed, appellant hereby petitions for an appropriate extension of time. The fee for any such extension may be charged to our Deposit Account No. 01-2340, along with any other additional fees which may be required with respect to this paper.

Respectfully Submitted,

ARMSTRONG, WESTERMAN & HATTORI, LLP



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Enclosures: Appendix
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APPENDIX

1. A cleaning method of an electronic component wherein an object to be cleaned is cleaned by bringing a sponge member into contact with the object to be cleaned while supplying, to said object to be cleaned, water containing carbon dioxide gas having a resistivity value of less than 5 M Ω.

3. A cleaning method of an electronic component according to claim 1, wherein said sponge member is separated from said object to be cleaned during cleaning, and said water is supplied also to said separated sponge member.

5. A cleaning method of an electronic component according to claim 1, wherein said object to be cleaned is a ceramic wafer.

7. A cleaning method of an electronic component according to claim 3, wherein said object to be cleaned is a ceramic wafer.

9. A cleaning method of an electronic component wherein an object to be cleaned is soaked in cleaning water having the resistivity value of 10MΩ or less before cleaning.

10. A cleaning method of an electronic component according to any one of claims 1, 3, 5, 7 or 9, wherein said object to be cleaned is soaked in water having a resistivity value of 10MΩ or less before cleaning.